bronchopneumonia and a severe purulent otitis media). The age of the patients varied from fourteen to thirty-nine years. There was one death in the series, but no autopsy was made. This was due to a B. type of infection.

In conclusion, there seems to be a definite pulmonary form of paratyphoid fever which may be easily mistaken for any of the acute respiratory infections. The pulmonary symptoms and findings often precede any intestinal manifestations. Of the pulmonary complications, bronchopneumonia is the most alarming. As it has been shown that the bacilli are found in the sputum, we must recognize that bronchial infection may result in the patient becoming a chronic carrier as well as being a means of spreading the infection in the wards of a hospital. It is of interest to note that the bacilli have also been isolated from the purulent discharges of a chronic purulent otitis media, caused by other infections previous to the paratyphoid disease and that they were found as late as sixty-five days after the beginning of the illness. The organisms were also isolated from the secretions of a pyorrhea alveolaris. In view of Minet's findings and his ascribing the paratyphoid bacillus as the etiological factor in his cases of chronic bronchitis, it is worth while to examine the sputum of certain types of our chronic pulmonary invalids for this group of bacilli.

We wish to express our thanks to Dr. Joseph Sailer for the privilege of reporting two of the cases, as they occurred upon his service in the Philadelphia General Hospital.

A CASE OF PURPURA DURING SERUM DISEASE.[1]

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The following case of purpura which occurred during the course of serum disease following the use of antipneumococcus I horse serum in pneumonia is of such rare occurrence as to warrant its being reported.

S. M., Austrian, aged twenty years, clerk, was admitted to the Presbyterian Hospital on February 16, 1917, complaining of pain in the left chest, with chills and fever. The onset had been sudden the night before, with headache, cough, bloody sputum and vomiting. His family history was negative for chronic illnesses. He had had measles as a child but no other infectious diseases. He had never been given antitoxin of any kind. Three years before he had come to the Presbyterian Hospital dispensary because of the loss of twenty-five pounds in weight, with cough and night-sweats. No physical signs of tuberculosis were found in the lungs and no tubercle bacilli were found in the sputum. He had rapidly regained his lost weight and had been well until the present illness, except for an attack of "indigestion" six months before. There was no history of bruises, epistaxis, hematuria, bloody sputum, blood in the stools or skin eruptions.

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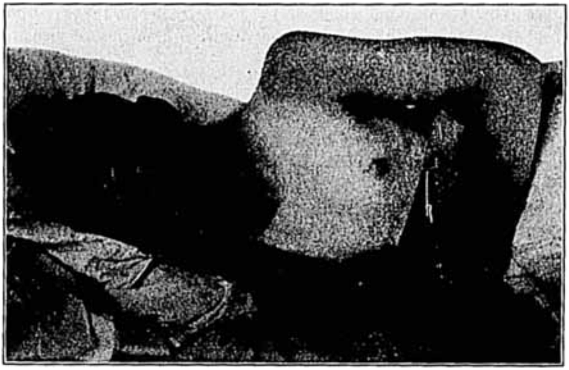
[1] From the wards of the Presbyterian Hospital, New York City.

On physical examination he was found to have consolidation of practically the whole left lower lobe. Cheeks were flushed, breathing was rapid and grunting, with frequent cough and glairy, bright red sputum. His heart was normal except for a rough systolic murmur localized to the pulmonic area. His abdomen was not distended. There was no skin eruption. Temperature 104.6° F., pulse 112 and respirations 34. Examination of the blood showed 21,600 white blood cells, with 90 per cent. polymorphonuclear leukocytes. Blood culture gave no growth of bacteria. The sputum was injected into a mouse, from which was recovered pneumococcus Type I.



Purpura occurring during serum disease. Note intensity of eruption below point of constriction of right arm by tourniquet.

Intracutaneous tests were performed with horse serum, using human serum and carbolized saline as controls. All were negative. One hundred cubic centimeters of antipneumococcus serum obtained from the Rockefeller Institute was given intravenously, diluted with 100 c.c. of normal saline. The patient experienced a slight chill, with dyspnea, which was relieved by atropin and adrenalin given subcutaneously. His temperature rose from 104° to 105° and then fell gradually to 102° in the next eight hours. At that time another 100 c.c. of serum were given, with no discomfort to the patient. His temperature continued to fall, reaching 100° twelve hours later, when a third dose of serum was given. The following day his temperature was 98.6°, white blood cells 6100 with 77 per cent. polymorphonuclear leukocytes. The physical signs suggested the presence of free fluid in the left chest, which roentgen ray failed to confirm. Four days later exploration of the left chest recovered 10 c.c. of bloody fluid, which showed no organisms on smear and no growth on aërobic and anaërobic culture.

Seventh Day after First Serum Administration. A general slight enlargement of the lymph nodes appeared, with patches of erythema and urticaria scattered over the skin and numerous minute bright red petechial hemorrhages over the chest.

Tenth Day. The urticaria persisted, the lymph nodes were much enlarged and the inguinal nodes were quite tender. Face and eyelids were puffy. Patient complained of pain in both temporomandibular joints, in both shoulders and in the joints of both hands.

Eleventh Day. Patient complained of pain in all joints of his extremities except his ankles and feet. There was general slight swelling of all extremities. There was a diffuse papular erythema of the whole body. There was marked conjunctivitis in both eyes. A few urticarial wheals and new petechial spots were present. Temperature rose to 102.4°. The patient's blood showed the presence of precipitins for horse serum.

Twelfth Day. Throat was sore and diffusely red. Patient coughed up a little blood-tinged mucus. White blood cells were 13,600, with 87 per cent. polymorphonuclear leukocytes.

Thirteenth Day. Temperature, 104°. Cervical and inguinal nodes tender. At night the patient had a severe epistaxis, which was checked only by packing both anterior and posterior nares.

Fourteenth Day. Erythema somewhat faded, but many minute petechial spots appeared over thighs and chest. After the application of a tourniquet to the right arm above the elbow for venous puncture, a profuse purpuric eruption appeared all over the arm below the point of constriction. Skin and mucous membranes were now quite pale. Joint pains practically gone. Blood platelets, 315,000 per c.mm. Normal control, 330,000. Bleeding time, two minutes. Coagulation time, six minutes. Normal control, seven minutes. White blood cells, 10,600, with 83 per cent. polymorphonuclear leukocytes. Urine showed a faint trace of albumin and a negative guaiac test for blood.

Fifteenth Day. Petechial hemorrhages were present all over the body and in the mucous membranes of the mouth. There were several large submucous hemorrhages in the soft palate, probably caused by trauma in packing the posterior nares. The lymph nodes were still quite tender. Erythema still present as well as a few new urticarial wheals. The spleen was palpable for the first time. Ophthalmoscopic examination revealed no hemorrhages in the choroid.

Sixteenth Day. Fresh petechial spots present on the shoulders and along scratch marks on the back. Red blood cells, 3,700,000; hemoglobin, 80 per cent. White blood cells, 6600: polymorphonuclear leukocytes, 79 per cent.

Seventeenth Day. Petechial eruption more extensive. Gums bleeding slightly. Spleen no longer palpable. Dark blood passed with a stool. Temperature, 101.6° to 103.4°.

Twenty-first Day. Temperature normal. General condition much better. Purpuric eruption gone except on buttocks and thighs. No more joint pains. Lymph nodes, especially one in the submaxillary region, still large but not tender.

Twenty-fifth Day. Temperature suddenly rose to 103.8°. Patient complained of difficulty in breathing and of very sore-throat. Swallowing very difficult, permitting the taking of fluids only. A hemorrhagic area was present on the left tonsil.

Twenty-sixth Day. Slight epistaxis. Petechial hemorrhages have all disappeared from the skin. Tourniquet applied to right arm for ten minutes produced no purpuric eruption. Lungs clear except for a few dry, inspiratory rales at the left base. Red blood cells, 4,300,000; hemoglobin, 60 per cent.; white blood cells, 19,000; polymorphonuclear leukocytes, 84 per cent.

Twenty-seventh Day. Nose and throat examined by Dr. Coakley. There was an area of ecchymosis on the right side of the nasal septum and on the right lower turbinate, possibly from the packing. The uvula was edematous, with diffuse capillary hemorrhages on the posterior surface. These extended to the posterior pillars of the fauces, which were very edematous. The anterior pillars were less so. Fresh blood was leaking from the left lateral pharyngeal wall, the point of origin not being visible. The epiglottis was very edematous on the left side, involving the left arytenoid cartilage. There was an ecchymotic area on the upper surface of the epiglottis. The vocal cords were congested.

Twenty-ninth Day. Slight epistaxis occurred. Another new petechial spot. Throat less edematous. Temperature rose in the afternoon to 104.6°. For the past few days every stool had contained either streaks or clots of blood.

Thirtieth Day. Temperature normal. Patient transferred to the hospital roof and felt much better.

From this time on the temperature continued normal and convalescence was rapid. No more petechial hemorrhages appeared and no more blood appeared in the stools. The swelling of the throat rapidly disappeared and the lymph nodes returned to their normal size.

Thirty-sixth Day. Precipitins for horse serum still present in patient's blood.

Thirty-seventh Day. Red blood cells, 4,100,000; hemoglobin, 60 per cent.; white blood cells, 9100, polymorphonuclear leukocytes, 61 per cent.

Fortieth Day. Patient discharged.

DISCUSSION. Schultz,[2] in discussing "Anaphylactoid Purpura," mentions three cases reported by Widmer[3] in which "purpura simplex" followed the administration of diphtheria antitoxin to small children. The only other case of purpura following the administration of serum, which we have been able to find in the literature is one reported by Flandin,[4] in which the subcutaneous administration of one dose of diphtheria antitoxin was followed thirteen days later, when the patient got up, by edema of the legs, arthritis with effusion, urticaria, erythema and purpura. The symptoms disappeared after rest in bed but recurred each time the patient got up. Calcium chloride and peptone injections had no effect on the recurrences, but finally minimal doses of normal horse serum (0.1 to 0.2 c.c.) given hypodermically, rapidly dispelled the symptoms. After this they reappeared mildly every two or three months and were each time relieved by small doses of horse serum. Each time the symptoms recurred the patient's blood serum was found to be toxic for a guinea-pig. After the injection of horse serum, however, this toxicity disappeared.

The occurrence of purpura during the course of these cases of serum disease seems to link serum disease etiologically more closely with the group of conditions commonly known as idiopathic purpura. The type of purpura observed in our case is not that which is characteristic of purpura hemorrhagica where there is a marked decrease in the number of blood platelets and where the bleeding time is greatly prolonged. (Platelets and bleeding time were both normal in our case.) But all these cases showed many of the features of the purpura which appear as a secondary manifestation of some of the acute infectious diseases or which occurs without any demonstrable cause or any abnormality of the blood elements. Osler[5] has followed many of these cases through varied manifestations of the disease, extending over many years and with several distinct attacks, some of which were associated with joint pains, some with abdominal pains, erythema, urticaria or even angioneurotic edema. Sometimes the purpura itself did not appear but the same pathological condition was suggested by the appearance of the other symptoms.

In the case reported we have the symptoms of both purpura and serum disease and we have a known foreign substance in the blood and tissues (horse serum), which, either by its own presence or by the attempt of the patient to eliminate it, may be safely inferred to be etiologically associated with all of the symptoms. In our case there is considerable evidence that the purpuric eruption was due not to any abnormality of the blood but to some temporary lesion of the finer bloodvessels. The most marked eruptions occurred in regions which were most exposed to trauma, namely, the nasal and pharyngeal mucosa, the extensor surfaces of the arms, especially about the elbows, the buttocks, along scratch marks on the back, and especially on the arm below the site of constriction by a tourniquet which shut off the venous return and thereby caused distention of the capillaries. On the other hand, in places like the conjunctiva and retina, where trauma is not likely to be a factor, no hemorrhages occurred.

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[2] Ergeb. d. Inn. Med. u. Kinderheilk., 1919, xvi, 32.

[3] Med. Klin., 1917, Nr. 39.

[4] Bull. et mém. Soc. méd. des hôp., 1914, xxx, 242.

[5] British Med. Jour., 1914, i, 517.

Bloodvessel lesions have been found in some experimental conditions in which capillary hemorrhages occurred. Gay and Southard[6] in their early studies in anaphylaxis found hemorrhages in the gastric mucosa, lungs, spleen, heart muscle, brain and several other organs of sensitized guinea-pigs, which had died of anaphylaxis following a toxic dose of horse serum. Associated with the hemorrhages they found focal fatty infiltration of endothelial cells of the capillaries. Flexner and Noguchi,[7] and later Pearce,[8] in studying snake-venom poisoning, also found lesions of the capillary endothelium associated with hemorrhages into various organs. The lesions here, however, were not fat infiltrations, but a swelling and lysis of the endothelial cells occurring focally and allowing extravasation of blood into the surrounding tissue. A third type of lesion of the capillary endothelium, which has been suggested as a possibility, from the result of a toxin introduced into the blood, is the dissolution of the so-called intercellular cement substance of the capillary endothelium, with extravasation of blood between the separated cells.

As no tissue from these cases was secured for microscopic examination the type of lesion in the capillaries, if one existed, can only be conjectured. In our case it is probable that any lesion which did occur was only temporary and lasted only as long as the effects of the toxic substance in the body continued. This is suggested by the fact that after the subsidence of the symptoms the application of a tourniquet to the arm no longer produced a purpuric eruption, as it had done during the height of the disease. The capillaries were again able to stand distention without rupturing. In Flandin's case, however, the lesion seems to have been much more permanent, for the symptoms recurred at intervals for an indefinite period and were only temporarily relieved by treatment. The toxicity of the patient's serum for a guinea-pig in his case seems to point to the production of a circulating toxin which periodically caused the appearance of the symptoms. Whatever the mechanism the evidence at hand suggests that the cause of some cases of purpura whose etiology is now so obscure may some day be demonstrated to be an intoxication following the introduction of a foreign protein into the body and therefore similar to the intoxication causing serum disease.

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[6] Jour. Med. Res., 1907, xvi, 143.

[7] Univ. Penna. Med. Bull., 1902, xv, 345.

[8] Pearce, R. M.: Jour. Exper. Med., 1909, xi, 532.

SUMMARY. 1. A case is described in which purpura occurred during the course of serum disease following the administration of antipneumococcus horse serum.

2. The elements of blood coagulation were normal, and it is therefore probable that the purpura was due to the presence of a toxin associated with the attempt of the body to eliminate the foreign protein.

3. The evidence points to the capillary walls as the site of the lesion.

4. Some cases of purpura of unknown etiology may be caused by the same type of intoxication which was present in this case.

PROGNOSTIC FACTORS IN PNEUMONIA DURING THE INFLUENZA EPIDEMIC.

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THE title of this paper is purposely evasive. It speaks of "the influenza epidemic" because it is by that term that the disease which swept the world nearly a year and a half ago is generally known. In adopting the term it is with the mental reservation shared by many others as to the primary etiological factor. What part the Bacillus pfeiffer played is difficult to judge from the widely varying reports of equally skilled observers. It is not within the scope of this paper to discuss that question.

Again, many patients suffered at that time from the disease known as influenza without having a complicating pneumonia. On the other hand we know that the outstanding cause of death during the epidemic was an inflammatory affection of the lungs generally referred to as "pneumonia." When patients were seen at varying periods of their illness it was often—indeed usually—impossible to be sure that existing pneumonia had been ushered in by influenza. This uncertainty is expressed by the phrase "pneumonia occurring during the influenza epidemic."

It seems desirable to include a consideration of lobar pneumonia as well as the bronchial type, since a fair percentage of cases of the